ISSN 1809-127X (online edition)

Open Access | Freely available at *www.checklist.org.br*

Check List
Journal of species lists and distribution

NOTES ON GEOGRAPHIC DISTRIBUTION

Lepidoptera, Nymphalidae, Heliconiinae, *Heliconius sara apseudes* (Hübner, 1813): Distribution extension

Cristiano Agra Iserhard *, Ana Kristina Silva, Marina Todeschini de Quadros, Daniel Souza Castro and Helena Piccoli Romanowski

Universidade Federal do Rio Grande do Sul, Departamento de Zoologia, Programa de Pós-Graduação em Biologia Animal. CEP 91501-970. Porto Alegre, RS, Brazil
* Corresponding author. E-mail: *cristianoagra@yahoo.com.br*

ABSTRACT: This work presents new records and extends the geographic distribution of *Heliconius sara apseudes* in the Atlantic Forest of the state of Rio Grande do Sul. Five new records were taken along butterfly inventories carried out between 2005 and 2010 in distinct phytophysiognomies at Rio Grande do Sul northeast region: Swamp Forest, Atlantic Forest *stricto sensu* and Araucaria Moist Forest. The fact that all registers occurred in well preserved habitats of the Atlantic Forest emphasizes the need of conservation of this biome in Rio Grande do Sul.

The Atlantic Forest biome is a global hotspot of biodiversity (Myers *et al*. 2000) and extends as far south as the northeast of Rio Grande do Sul (RS), the southernmost state of Brazil. At this region, altitude varies abruptly from sea level to 800-1,000 m in about 8-12 km, from the sandy Coastal Plain across the forested Serra Geral slopes up to the grasslands in the basaltic highlands (Campos de Cima da Serra region). As a corollary, different ecosystems are present and the physiognomy of the vegetation there shows distinctive characteristics according to the altitudinal gradient: Swamp Forest, Subtropical Atlantic Forest *stricto sensu* and Araucaria Moist Forest.

For RS, there are records published in the literature of twelve species of Heliconiini in seven genera: *Agraulis vanillae maculosa* (Stichel, 1908), *Dione juno juno* (Cramer, 1779), *Dione moneta moneta* Hübner, 1825, *Dryadula phaetusa* (Linnaeus, 1758), *Dryas iulia alcionea* (Cramer, 1779), *Eueides aliphera aliphera* (Godart, 1819), *E. isabella dianasa* (Hübner, 1806), *Heliconius besckei* Ménétriés, 1857, *H. erato phyllis* (Fabricius, 1775), *H. ethilla narcaea* Godart, 1819, *H. sara apseudes* (Hübner, 1813), and *Philaethria wernickei* (Röber, 1906) (Brown and Mielke 1972; Holzinger and Holzinger 1994; Iserhard and Romanowski 2004; Quadros *et al*. 2004; Teston *et al*. 2006).

Amongst the genus *Heliconius*, *H. erato phyllis* is abundant and has a wide distribution in Rio Grande do Sul; *H. ethilla narcaea* is more restricted towards Atlantic Forest and related habitats; and *H. besckei* has its range limited by the occurrence of Subtropical Atlantic Forest and Araucaria Moist Forest habitats and, accordingly, its distribution extends as far south as that of the Atlantic Forest (Iserhard and Romanowski 2004; Grazia *et al.* 2008).

The butterfly *H. sara apseudes* is distributed in the Atlantic Forest area along the Brazilian coast, predominantly in the southeastern region (Brown and Freitas 2000), and Santa Catarina State was thought to be the south limit of its distribution (Holzinger and Holzinger 1994). Recently, Quadros *et al*. (2004) recorded *H. sara apseudes* in Rio Grande do Sul for the first time: two specimens were collected in Capão da Canoa county, in the north area of the coastal plain in 1999 (Figure 1). Up to that date, apart from this record, no *H. sara apseudes* specimen from Rio Grande do Sul was deposited in any major entomological collections in south Brazil (*e.g*. Coleção Entomológica Padre Jesus Santiago Moure of Universidade Federal do Paraná, Museu Entomológico Ceslau Biezanko of Universidade Federal de Pelotas, Museu Anchieta de Ciências Naturais, Museu de Ciências e Tecnologia of Pontifícia Universidade Católica do Rio

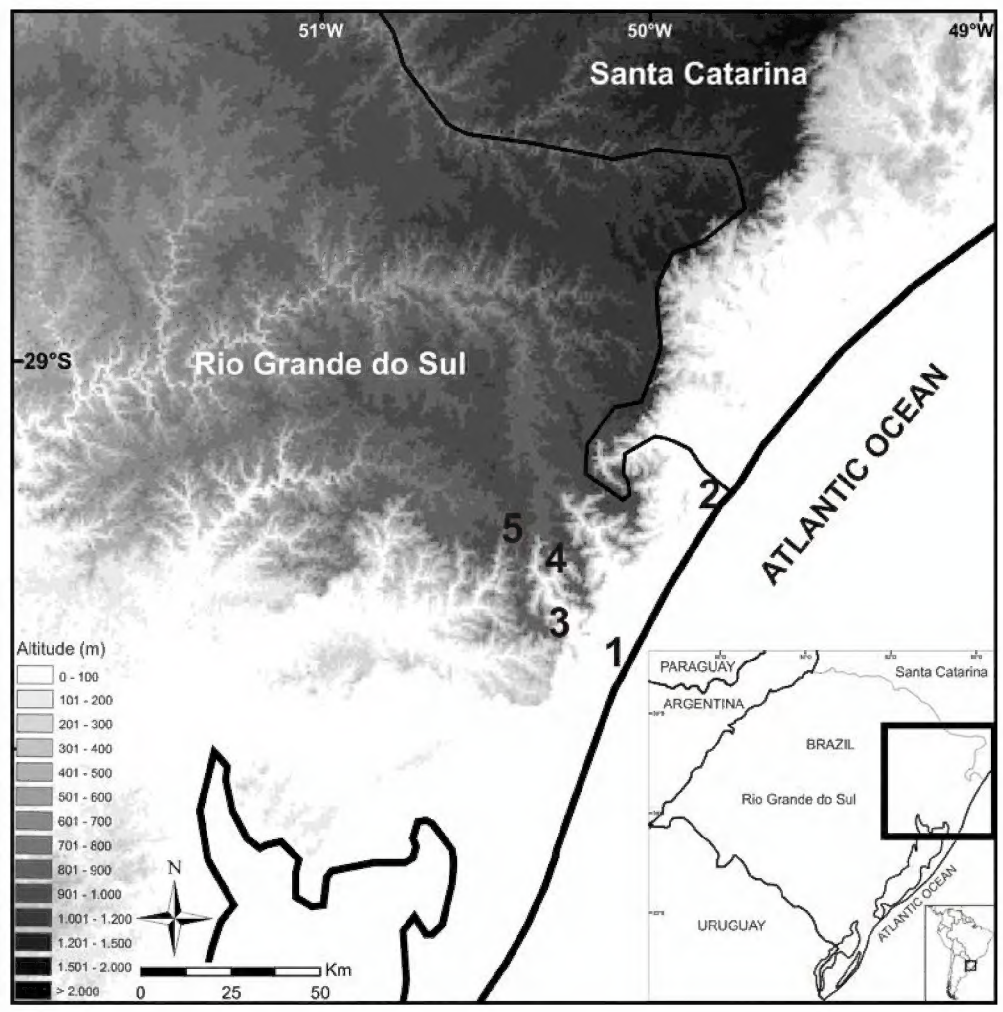

FIGURE 1. State of Rio Grande do Sul and sites where records of *Heliconius sara apseudes* were made. 1, Capão da Canoa county; 2, Itapeva State Park; 3 and 4, Maquine River valley; 5, São Francisco de Paula National Forest.

Grande do Sul, Museu de Ciências Naturais of Fundação Zoobotânica do Rio Grande do Sul and Coleção de Lepidoptera of Departamento de Zoologia of Universidade Federal do Rio Grande do Sul - UFRGS) and no information about records of this butterfly for southernmost Brazil in any other collection is known.

Very little data are available about this butterfly, and much of these are restricted to inventories, species lists and host plant information (Brown and Mielke 1972; Brown 1981). In the literature, there are records for at least six *Passiflora* species (Passifloraceae) used as host plants by larvae of *H. sara apseudes* (*Passiflora mucronata* Lam., *P. sidaefolia* Roem., *P. rhamnifolia* Mast., *P. edulis* Sims, *P. auriculata* Kunth and *Tetrastylis ovalis* (Vell. ex M. Roem.) Killip) (Brown and Mielke 1972; Brown 1981).

New records of *H. sara apseudes* were made along the "Borboletas do Rio Grande do Sul" Research Program, developed in Departamento de Zoologia of UFRGS, during butterfly inventories carried out between 2005 and 2010. The butterflies were observed and collected in three distinct areas of Atlantic Forest in RS: Itapeva State Park, in Torres; São Francisco de Paula National Forest, in São Francisco de Paula and Maquiné River valley, in Maquiné (Figure 1).

Itapeva State Park (29°21'46" S, 49°45'42" W) is one of the last and largest protected fragments of Swamp Forest in RS, comprising about 1,000 ha. It lays in a narrow stretch of land between the RS-389 road and Itapeva beach, near Torres town, at the extreme north of RS Coastal Plain (Lindeman *et al.* 1975). São Francisco de Paula National Forest (29°25'28" S, 50°23'35" W) is located in the grasslands of the basaltic highlands region, at the Riograndense Plateau (Fernandes and Backes 1998). It is about 1,606 ha, 900 m asl and the Araucaria Moist Forest is the prevailing type of vegetation, though pine plantations and grasslands also occur there. Maquiné town (29°35'01" S, 50°16'40" W) is between the Coastal Plain and Basaltic Plateau. Maquiné River valley basin has 546 km^2 of total area with the large variation of altitude (130 to 900 m) of the Serra Geral slopes. The vegetation is predominantly a dense subtropical forest, and the land cover consists of a vegetation mosaic of secondary forest in varied stages of development interspersed with agriculture (Iserhard and Romanowski 2004).

New occurrences: Brazil, Rio Grande do Sul: 1 ♂, Torres, Itapeva State Park, 20 m, 27.v.2005, C.A. Iserhard *leg.*; 2 ♂, Maquiné, Maquiné River valley, 250 m, 21.iv.2007, A.K. Silva and D.S. Castro *leg.* (CLDZ, Coleção de Lepidoptera do Departamento de Zoologia, Universidade Federal do Rio Grande do Sul); 2 individuals, São Francisco de Paula, São Francisco de Paula National Forest, 850 m, 09.v.2008, M.T. Quadros and 03.iv.2010, A.K. Silva, visual record.

The first register of *H. sara apseudes* in RS, in Capão da Canoa county (Quadros *et al.* 2004) was the southernmost limit of this species in Brazil, and the above records increase the south range of Atlantic Forest occupied by this butterfly in RS (Figure 1).

There are six passion vine species in these Atlantic Forest areas: *Passiflora actinia* Hook., *P. amethystina* Mikan, *P. caerulea* L., *P. capsularis* L., *P. edulis* and *P. suberosa* L. In each locality during sampling, about two or three species of *Passiflora* have been seen to occur, but there is no record about the use of these plants by *H. sara apseudes*, only the imagos were registered in RS so far. It must be pointed out, however, that the inventories carried out so far were not aimed to record the immature stages and/or its passion vine host plants during the period of occurrence of *H. sara apseudes*. Thus, it is suggested that at least some of these plants could well be the food resource for the immature stages, given the ecological plasticity of passion vine butterflies. The occasional use of more than one *Passiflora* species by heliconian larvae is registered in literature (Bianchi and Moreira 2005; Dell'Erba *et al.* 2005). This plasticity could make for the survival up to the adult stage, mostly so if the resource supply is scarce; eventually, even increase the geographic range (Chew 1975; Rodrigues and Moreira 2002; 2004). Nevertheless, according to Brown (1992) this butterfly is migrant in Serra do Japi (São Paulo State), and though occasionally uses other species of *Passiflora*, when this happens, the rates of growth are poor.

The new occurrences of this heliconian in Rio Grande do Sul points to an extension of the former assumed south distribution limit. Nova Trento municipality located in Santa Catarina State, distant about 180 km of Rio Grande do Sul boundaries was the commonly accepted one (Brown, unpublished data). Holzinger and Holzinger (1994) shows a map, where three occurrences of *Heliconius sara apseudes* in Santa Catarina are indicated in a rather imprecise way, which were further south than the above citation, close to Uruguay River near Rio Grande do Sul. Nevertheless, neither the localities nor the references are cited in the text. Therefore, where exactly this limit laid is not possible to say.

In face of the fact that *H. sara apseudes* was now registered in all ecosystems of Atlantic Forest in RS and covered the gradient from the Coastal Plain, across the slopes of Serra Geral, up the high altitude forest, we suggest that these records might represent more than mere migrant individuals, as it was suggested by Brown (1992) for the populations in Japi. However, given the lack of previous studies, paucity of knowledge about the biology and natural history of this species and the few specimens observed so far in RS, we urge that more efforts and specific inventories are needed to fully characterize and understand the status of occurrence of *H. sara apseudes* in this region of Atlantic Forest and the resources it is relying upon. Other implication is the need of conservation of this important biome and its different types of habitats, since the general distribution of this species is restricted to the Atlantic Forest, and all these new records in Rio Grande do Sul were taken in well preserved habitats.

Acknowledgments: The authors wish to thanks to Patrick Colombo for the map and helpful suggestions on the manuscript. To Dr. Olaf Mielke, Dr. Marcelo Duarte da Silva and Ms. Alfred Moser for sharing their information on *Heliconius sara apseudes*. CNPq (Process nº 473838/2006-0 and 472175/2007-6) financed part of this project and provided scholarship sto Marina Todeschini de Quadros and Helena Piccoli Romanowski, and CAPES provided scholarship to Cristiano Agra Iserhard. Contribution # 555 to the Departamento de Zoologia, UFRGS.

Literature Cited

Bianchi, V. and G.R.P. Moreira. 2005. Preferência alimentar, efeito da planta hospedeira e da densidade larval na sobrevivência e desenvolvimento de *Dione juno juno* (Cramer) (Lepidoptera, Nymphalidae). *Revista Brasileira de Zoologia* 22(1): 43-50.

Brown, K.S. Jr. 1981. The biology of *Heliconius* and related genera. *Annual Review of Entomology* 26: 427-456.

Brown, K.S. Jr. 1992. Borboletas da Serra do Japi: diversidade, habitats, recursos alimentares e variação temporal; p. 142-187 *In*: L.P.C. Morellato (ed.). *História Natural da Serra do Japi - Ecologia e preservação de uma área florestal no Sudeste do Brasil*. Campinas: Editora da Unicamp.

Brown, K.S. Jr. and A.V.L. Freitas. 2000. Diversidade de Lepidoptera em Santa Teresa, Espírito Santo. *Boletim do Museu de Biologia Mello Leitão* 11/12: 71-118.

Brown, K.S. Jr. and O.H.H. Mielke. 1972. The Heliconians of Brazil (Lepidoptera: Nymphalidae). Part II. Introduction and general comments, with a supplementary revision of the tribe. *Zoologica* 57: 1-40.

Chew, F.S. 1975. Coevolution of pierid butterflies and their cruciferous foodplants. I. The relative quality of available resources. *Oecologia* 20: 117-127.

Dell'Erba, R., L.A. Kaminski and G.R.P. Moreira. 2005. O estágio de ovo dos Heliconiini (Lepidoptera, Nymphalidae) do Rio Grande do Sul, Brasil. *Iheringia, Série Zoologia* 95(1): 29-46.

Fernandes, A.V. and A. Backes. 1998. Produtividade primária em floresta com *Araucaria angustifolia* no Rio Grande do Sul. *Iheringia, Série Botânica* 51(1): 63-78.

Grazia, J., H.P. Romanowski, P.B. Araújo, C.F. Schwertner, C.A. Iserhard, L.A. Moura and V.G. Ferro. 2008. Artrópodos Terrestres; p. 76-97 *In*: G. Bond-Buckup (ed.). *Biodiversidade dos Campos de Cima da Serra*. Porto Alegre: Libretos.

Holzinger, H. and R. Holzinger. 1994. *Heliconius and related genera*. Venette: Sciences Nat. 328p.

Iserhard, C.A. and H.P. Romanowski. 2004. Lista de espécies de borboletas (Lepidoptera: Papilionoidea & Hesperioidea) da região do vale do Rio Maquiné, Rio Grande do Sul, Brasil. *Revista Brasileira de Zoologia* 21(3): 649-662.

Lindeman, C.J., B. Irgang, M.L.P. Porto, M.L. Loscheiter and L.R.M. Batista. 1975. Estudos botânicos no Parque Estadual de Torres, Rio Grande do Sul, Brasil, II. Levantamento florístico da planície do curtume, da área de Itapeva e da área colonizada. *Iheringia, Série Botânica* 21: 15-52.

Myers N., R.A. Mittermeier, C.G. Mittermeier, G.A.B. Fonseca and J. Kent. 2000. Biodiversity hotspots for conservation priorities. *Nature* 403: 853-858.

Quadros, F.C., A.L. Dorneles and E. Corseuil. 2004. Ninfalídeos (Lepidoptera, Nymphalidae) ocorrentes no norte da Planície Costeira do Rio Grande do Sul. *Biociências* 12(2): 147-164.

Rodrigues, D. and G.R.P. Moreira. 2002. Geographical variation in larval host-plant use by *Heliconius erato* (Lepidoptera, Nymphalidae) and consequences for adult life history. *Brazilian Journal of Biology* 62: 321-322.

Rodrigues, D. and G.R.P. Moreira. 2004. Seasonal variation in larval host plants and consequences for *Heliconius erato* (Lepidoptera, Nymphalidae) adult body size. *Austral Ecology* 29: 437–445.

Teston, J.A., K.G. Toledo and E. Corseuil. 2006. Ninfalídeos (Lepidoptera, Nymphalidae) ocorrentes no Rio Grande do Sul, Brasil. Parte III. Heliconiinae e Libytheinae. *Biociências* 4(2): 208-213.

Received: December 2009
Revised: April 2010
Accepted: May 2010
Published online: June 2010
Editorial responsibility: Cristiano Lopes-Andrade